

APRIL/MAY 2025

**23UEBT42 — BIOINFORMATICS AND
BIostatISTICS (Elective IV)**

Time : Three hours

Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

18. Explain the concept of multiple sequence alignment (MSA). Describe different methods used for MSA and discuss its significance in evolutionary and functional analysis of genes and proteins.
19. Explain the process of statistical data collection, classification, and tabulation. Discuss the importance of proper data organization in statistical analysis.
20. A researcher wants to compare the effectiveness of three different fertilizers on crop yield. The yield (in kg) from three different fields using these fertilizers is recorded as follows :

Fertilizer A : 50 55 53 57 52

Fertilizer B : 60 65 62 64 63

Fertilizer C : 70 72 68 75 71

Perform an Analysis of Variance (ANOVA) to determine if there is a significant difference between the yields of the three fertilizers.

1. What are the three main components of bioinformatics?
2. Define genome, transcriptome and proteome.
3. What is sequence analysis in the context of proteins and nucleic acids?
4. Name two commonly used protein databases and their significance.
5. What is multiple sequence alignment, and why is it important?
6. Name two methods used for multiple sequence alignment.
7. What are the key steps involved in statistical data collection and classification?
8. Define tabulation and explain its importance in statistical analysis.

9. What is the role of analysis of variance (ANOVA) in statistical studies?
10. Name two commonly used statistical software and their applications.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Explain the difference between correlation and regression with an example.
Or
(b) Describe the binomial and Poisson distributions and mention one key application of each.
12. (a) Explain the process of collection, classification, and tabulation of statistical data with an example.
Or
(b) What are the different types of graphs used for diagrammatic representation of statistical data? Explain any two.
13. (a) Explain the role of chemical libraries in drug design and development.
Or
(b) What is molecular docking? Discuss its significance in drug design.

14. (a) What is sequence analysis? Explain its significance in the study of proteins and nucleic acids.

Or

- (b) Describe the importance of protein databases and how they aid in protein research.
15. (a) Define genome, transcriptome, and proteome. How are they related to bioinformatics?

Or

- (b) What are gene prediction tools? Name two commonly used gene prediction software and their functions.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Explain the concepts of genome, transcriptome, and proteome in bioinformatics. Discuss their significance in understanding biological functions and disease mechanisms.
17. What are protein visualization tools? Discuss the features and applications of RASMOL in analyzing protein structures and its significance in bioinformatics research.

